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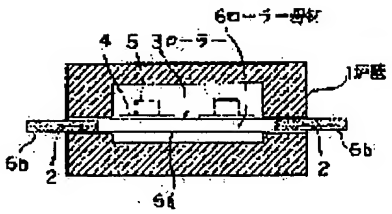
(71)Applicant : NGK INSULATORS LTD
N G K ADRECH KK
(72)Inventor : KOMIYAMA TSUNEO
SUZUKI IWAO

(54) ROLLER FOR ROLLER HEARTH KILN

(57)Abstract:
PURPOSE: To restrain the oxidative deterioration at a part of a roller in a furnace under using at high temp. and also at both end parts of the roller penetrating the furnace walls in the roller used to a roller hearth kiln.
CONSTITUTION: The roller base material 6 is constituted with recrystallized silicon carbide and in this roller base material 6, alumina and calcia are contained at the part 6a positioned in the furnace and metallic silicon is impregnated into both end parts 6b, 6b of the material in the outsides from the furnace walls 1.



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CLAIMS

[Utility model registration claim]
[Claim 1] In the slow away type cutting tool with which it is equipped with a throwaway tip free [attachment and detachment], and it grows into the chip mounting eye formed in the body of a tool Between the above-mentioned throwaway tip and a chip mounting eye While the sheet member which has a chip clamp screw hole is infixed and this sheet member is pressed and fixed to the base side of the above-mentioned chip mounting eye by the clamp member The above-mentioned throwaway tip makes the side face of at least 1 of this throwaway tip contact the wall surface of the above-mentioned chip mounting eye. The slow away type cutting tool characterized by screwing on the above-mentioned chip clamp screw hole the chip clamp screw inserted in the throwaway tip concerned, and fixing it to the above-mentioned sheet member.
[Claim 2] It is the slow away type cutting tool according to claim 1 characterized by the above-mentioned throwaway tip making other side faces of at least 1 of this throwaway tip contact the above-mentioned supporter while a supporter is infixed between the above-mentioned sheet member and the above-mentioned clamp member.

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DETAILED DESCRIPTION

[Detailed explanation of a design]
[0001]
[Industrial Application]
This design is related with slow away type cutting tools (it abbreviates to a cutting tool hereafter.) with which the chip mounting eye of the body of a tool was equipped with the throwaway tip (it abbreviates to a chip hereafter.) through the sheet member, such as an end mill and a face cutter.
[0002]
[Description of the Prior Art]
As a clamp device of the chip in such a cutting tool, the thing as shown, for example in drawing 9 and drawing 10 or drawing 11 , and drawing 12 is known.
They are the chip mounting eye which is the body of a tool with which a sign 1 consists of steel materials etc. in these drawings and by which the chip pocket by which a sign 2 is formed in this body 1 of a tool, and a sign 3 are formed in the tool hand-of-cut (it sets to each drawing and is left-hand side from right-hand side) back side of this chip pocket 2, and a sign.
4 is the plate-like chip of products made from hard material, such as cemented carbide with which this chip mounting eye 3 is equipped. In addition, drawing 9 and drawing 11 show the example equipped with the chip 4 with which top-face 4A used as a rake face is made into the flat side among these drawings, and drawing 10 and drawing 12 show the example equipped with the chip 4 with a breaker with which the way was dented among this top-face 4A.
[0003]
Here, in the example shown in drawing 9 and drawing 10 , the chip mounting eye 3 is equipped with the chip 4 through the plate-like sheet member 5. Moreover, ahead [of the chip mounting eye 3 / tool hand-of-cut], the crevice 6 is formed on the base of a chip pocket 2, and the wedge member 7 is inserted in this crevice 6.
And by pushing in this wedge member 7 in a crevice 6 with a clamp screw (illustration abbreviation) etc., a chip 4 is pressed at the base 3A side that top-face 4A turns [A] to the tool hand of cut of the chip mounting eye 3, and is fixed to the body 1 of a tool. in addition, this example -- setting -- the cutting edge of a chip 4 -- the location of 4B is positioned when side-face 4C of a chip 4 contacts wall surface 3B of the chip mounting eye 3.
[0004]
On the other hand, in the example shown in drawing 11 and drawing 12 , while through tube 4D is formed in the thickness direction at a chip 4, chip clamp screw hole 3C is formed in base 3A of the chip mounting eye 3, and the chip 4 has composition fixed to the body 1 of a tool by screwing on chip clamp screw hole 3C the chip clamp screw 8 inserted in the above-mentioned through tube 4D.
[0005]
[Problem(s) to be Solved by the Device]
however, in the example first shown in drawing 9 and drawing 10 , that are the structure which presses a chip 4 from the top-face 4A side which becomes the rake face by the wedge member 7, and is fixed, and a part of top-face 4A is covered with the wedge member 7 avoids -- not

having -- this -- a failure -- becoming -- a cutting edge -- there was a possibility that eccritic [of the swarf generated by 4B] might be checked. Moreover, since the volume of a chip pocket 2 was made to decrease by the wedge member 7, there was also a possibility that chip packing might arise.

[0006]

A wedge member etc. seems not to become a failure on the other hand, in the example shown in drawing 11 and drawing 12 , since a chip 4 is directly attached in the chip mounting eye 3 with the chip clamp screw 8, without using a wedge member etc.

However, in order to arrange so that top-face 4A used as the rake face of a chip 4 may become perpendicular to a tool hand of cut, chip clamp screw hole 3C screwed in the chip clamp screw 8 must be formed along the tangential direction of the body 1 of a tool. And in order to form such a screw hole in base 3A which turns to the tool hand of cut of the chip mounting eye 3, as shown in drawing 11 and drawing 12 , a chip pocket 2 must also be formed along the tangential direction of the body 1 of a tool, and, for this reason, the width of face W of body of tool 1 hoop direction of each chip pocket 2 cannot but become larger than the example shown in drawing 9 and drawing 10 .

Consequently, in the cutting tool shown in drawing 11 and drawing 12 , the number of the chip pockets 2 which can be formed in the body 1 of a tool of fixed magnitude, i.e., the number of the chips 4 with which the body 1 of a tool can be equipped, will be restricted naturally, and it had the problem that will cause increase of the cutting load which acts on each chip 4, and a chip life will be shortened.

[0007]

[Means for Solving the Problem]

In the cutting tool which it was made in order that this design might solve such a technical problem, and the chip mounting eye formed in the body of a tool is equipped with a chip free [attachment and detachment], and changes Between this chip and a chip mounting eye, the sheet member which has a chip clamp screw hole is infixed. While this sheet member is pressed to the base side of a chip mounting eye by the clamp member and fixing It is characterized by having screwed on the above-mentioned chip clamp screw hole the chip clamp screw which the side face of at least 1 was made to contact the wall surface of a chip mounting eye, and inserted the above-mentioned chip in the chip concerned, and fixing to the above-mentioned sheet member.

[0008]

[Function]

In the cutting tool of such a configuration, a chip is attached in a sheet member with a chip clamp screw, and this sheet member is attached in the body of a tool by clamp members, such as a wedge member. Therefore, while being able to fix a chip to the body of a tool, preventing covering a chip top face with a wedge member and attaining smooth swarf discharge, without pressing a chip top face directly by the wedge member like the conventional cutting tool, the volume of a chip pocket is securable.

Moreover, since the chip clamp screw hole which a chip clamp screw screws on will be formed in a sheet member, in order to form such a screw hole, it becomes possible [stopping that it becomes unnecessary to form a chip pocket along the tangential direction of the body of a tool, and the width of face of the hoop direction of a chip pocket becomes long unnecessarily].

[0009]

[Example]

Drawing 1 thru/or drawing 5 show one example at the time of using this design for a face cutter. It is referred to as attaching hole 11A at the time of nothing, among those a periphery equipping the spindle nose of a machine tool etc. with the shape of a multistage cylinder whose diameter is expanded as the body 11 of a tool is formed from steel materials etc. and it goes to the tip side in these drawings. And two or more chip-pocket 12 -- is formed in the point periphery of this body 11 of a tool along that hoop direction at regular intervals, and they are these chip pockets 12. -- Tool hand of cut (it sets to drawing 2 and is the direction of a counterclockwise rotation) Back, the chip mounting eye 13 is formed.

[0010]
Base 13A of the shape of an abbreviation rectangle which sees from a tool hand-of-cut front side, and is prolonged in the direction of tool axis O, and two wall surfaces 13B and 13C which rise high from this base 13A, and go to a tool hand-of-cut front side are formed in this chip mounting eye 13. Heights 13D which swells toward the direction outside of the diameter of a tool into the tool hand-of-cut front part is formed in wall surface 13B which crosses in the direction of the diameter of a tool among these wall surfaces 13B and 13C. Moreover, it escapes to a part for an intersection with base 13A, and 13E is formed in wall surface 13C which meets in the direction perpendicular to the direction of tool axis O among wall surfaces 13B and 13C. Furthermore, the crevice 14 dented inside [direction of path] the body 11 of a tool is formed in the tool hand-of-cut front side from the chip pocket 12 rather than this chip mounting eye 13 the direction end face side of tool axis O of this chip mounting eye 13, and the clamp screw hole which is not illustrated is formed in base 14A of this crevice 14.
[0011]
The chip 15 with which such a chip mounting eye 13 is equipped on the other hand is considered as the chip with a breaker with which top-face 15A which is the chip of the abbreviation square plate-like positive type formed from hard material, such as cemented carbide as shown in drawing 6 and drawing 7 , and becomes a rake face was dented in the chip thickness direction inside by this example. moreover -- the crossover ridgeline section of top-face 15A of this chip 15, and each side-face 15B -- a cutting edge -- 15C is formed.
Furthermore, insertion hole 15E which penetrates in that thickness direction and carries out opening of the chip 15 concerned to the center section of the above-mentioned top-face 15A and inferior-surface-of-tongue 15D is formed in this chip 15.
[0012]
In this example, the above-mentioned chip mounting eye 13 is equipped with the chip 15 of such a configuration through the sheet member 16.
It is the abbreviation Nogata form plate-like member in which this sheet member 16 was formed from hard material, such as cemented carbide, as well as [in this example] a chip 15, and the configuration and magnitude of those vertical sides 16A and 16B spread abbreviation etc. on base 13A of the chip mounting eye 13, and it is set up. Moreover, the thickness of this sheet member 16 is set up so that it may become smaller than the height of the wall surfaces 13B and 13C of the chip mounting eye 13, and as shown especially in drawing 5 , it is set up smaller than the height to heights 13D of base 13A to wall surface 13B of the chip mounting eye 13.
Furthermore, chip clamp screw hole 16C which penetrates the sheet member 16 concerned in that thickness direction is formed in this sheet member 16 so that opening may be carried out to one end-face 16D side of the sheet member 16 rather than the center of a longitudinal direction of top-face 16A.
[0013]
Such a sheet member 16 sticks inferior-surface-of-tongue 16B to base 13A of the chip mounting eye 13. While turning end-face 16D of the method of top Norikazu to the direction tip side of tool axis O, other-end side 16E is made to contact wall surface 13C of the chip mounting eye 13. Moreover, one side-face 16F are made to contact wall surface 13B, the chip mounting eye 13 is equipped, and in this condition, above-mentioned chip clamp screw hole 16C is arranged so that opening may be carried out to the direction tip side of tool axis O of the chip mounting eye 13 toward a tool hand of cut.
On the other hand, the wedge member 17 as a clamp member in this example is inserted in the above-mentioned crevice 14 formed ahead [of the chip mounting eye 13 / tool hand-of-cut]. And by screwing on the above-mentioned clamp screw hole the clamp screw 18 inserted in this wedge member 17, and bolting it, the above-mentioned sheet member 16 is pressed by press side 17A of the wedge member 17 towards the base 13A side of the chip mounting eye 13, and is fixed to the body 11 of a tool.
[0014]
In addition, in this example, the plate-like supporter 19 is infixed between press side 17A of this wedge member 17, and top-face 16A of the sheet member 16. This supporter 19 is the member

plate-like [rectangular] formed from hard material, such as cemented carbide, as well as [in this example] the above-mentioned chip 15 and the sheet member 16. While sticking inferior surfaces of tongue 19A and 19B to above-mentioned press side 17A and top-face 16A of the sheet member 16 moreover, respectively and turning the side-face 19C of 1 to the direction tip side of tool axis O With this side-face 19C, other side-face 19D of 1 of the opposite side is made to contact wall surface 13C of the chip mounting eye 13, and it **** between the wedge member 17 and the sheet member 16.
Thus, by fixing the sheet member 16 to the chip mounting eye 13, it will be demarcated by top-face 16A of the sheet member 16, heights 13D of wall surface 13B of the chip mounting eye 13, and supporter 19 top Norikazu's side-face 19C, and the hollow which carries out opening to the apical surface and peripheral face of a chip pocket 12 and the body 11 of a tool will be formed in this chip mounting eye 13. In addition, above-mentioned chip clamp screw hole 16C is set up so that opening may be carried out in the center of abbreviation of top-face 16A of the sheet member 16 in this hollow.
[0015]
And the above-mentioned chip 15 makes another side contact supporter 19 top Norikazu's side-face 19C while making one side of the two side faces 15B and 15B which are made to stick inferior-surface-of-tongue 15D to top-face 16A of the sheet member 16 in this hollow, and cross mutually contact heights 13D, and the hollow formed in this chip mounting eye 13 is equipped with it.
Furthermore in this condition, the cutting edges 15C and 15C which stand in a row on two side faces 15B and 15B other than above-mentioned two side-faces of chip 15 15B, and 15B It is set up so that it may project slightly from the apical surface and peripheral face of the body 11 of a tool, respectively. And by being arranged so that insertion hole 15E of a chip 15 and chip clamp screw hole 16C may serve as the abbreviation same axle, inserting the chip clamp screw 20 in this insertion hole 15E, and screwing on and concluding to chip clamp screw hole 16C A chip 15 is fixed to the body 11 of a tool through the sheet member 16. In addition, in side-face 19C of 1 of a field and the above-mentioned supporter 19 which turns to the tool periphery side of the above-mentioned heights 13D, it is side-face 15B of a chip 15. -- The tilt angle is attached according to recess.
[0016]
It seems that will see from a tool periphery side as it is indicated in drawing 4 as a chip 15 and the wedge member 17, it will be arranged so that it may stand in a line in the direction of tool axis O, and the wedge member 17 covers ahead [of top-face 15A / tool hand-of-cut] used as the rake face of a chip 15, and it does not hang over it in the cutting tool of such a configuration.

For this reason, smoothly, the swarf generated by the cutting edges 15C and 15C of a chip 15 will flow, will be discharged in a chip pocket 12, can aim at improvement in swarf eccritic compared with the conventional cutting tool as shown in drawing 9 and drawing 10 , and can prevent generating of chip packing.
[0017]
Moreover, in the cutting tool of the above-mentioned configuration, the chip clamp screw 20 for fixing a chip 15 is screwed on chip clamp screw hole 16C formed in the sheet member 16. For this reason, it is not necessary to form a screw hole in the body 11 of a tool along that tangential direction, therefore to form a chip pocket along this tangential direction like the conventional cutting tool shown in drawing 11 and drawing 12 .
It can stop by this that the width of face W of body of tool 11 hoop direction of a chip pocket 12 becomes large beyond the need, therefore the number of the chip pockets 12 which can be formed in the body 11 of a tool, i.e., the number of the chips 15 with which the body 11 of a tool can be equipped, can be increased, and while being able to aim at reduction of the cutting load which acts on each chip 15, it becomes possible to raise a cutting efficiency.
[0018]
Furthermore, by this example, a chip 15 makes other side-face 15B of 1 which that side-face 15B of 1 is made to contact heights 13D of wall surface 13B of the chip mounting eye 13 formed

in the body 11 of a tool, and intersects this side-face 15B of 1 contact side-face 19C of 1 of the supporter 19 ****(ed) between the sheet member 16 and the wedge member 17, and is positioned. With side-face 19C of 1 of this supporter 19 here other side-face 19D of 1 of the opposite side Since it is made to contact wall surface 13C of the chip mounting eye 13 formed in the body 11 of a tool, as a result a chip 15 While side-face 15B of 1 contacts the body 11 of a tool directly, other side-face 15B of 1 will be too positioned in contact with the body 11 of a tool through a supporter 19.

For this reason, according to this example, in spite of fixing the chip 15 to the body 11 of a tool through the sheet member 16, it becomes it is possible to secure that location precision with the high level, and possible to aim at improvement in the location precision of the cutting edges 15C and 15C formed in this chip 15, and the deflection precision of the so-called edge of a blade.

[0019]

By this example, the sheet member 16 and the supporter 19 are formed from hard material, such as cemented carbide, as well as a chip 15 further again. For this reason, although the number of components increases compared with the former while extension of the life of these members is achieved, it becomes possible to secure the rigidity of the chip mounting-eye 13 circumference.

[0020]

In addition, in this example, although the supporter 19 was infixed between the sheet member 16 and the wedge member 17, it is good also as a configuration which does not prepare such a supporter. In this case, it is possible to secure the location precision of a chip 15 by preparing a step which applies, for example to top-face 16A of the sheet member 16 at a supporter 19, and making side-face 15B of 1 besides the above of a chip 15 contact the level difference side of this step and top-face 16A.

moreover, the chip 15 without a breaker although the positive type chip with a breaker as shown in drawing 6 and drawing 7 as a chip 15 was used in this example, as the cross section shown, for example in drawing 8 -- or the chip of a negative mold may be used.

furthermore -- although this example explained the case where this design was used for a face cutter -- the shaving-by-rolling tool of others for example, such as an end mill of a slow away type, -- or it can also use for the boring bar of a slow away type, a cutting tool, etc.

[0021]

[Effect of the Device]

As explained above, according to this design, for this reason, improvement in swarf eccritic can be aimed at so that clamp members, such as a wedge member, cannot cover the rake face of a chip, and generating of chip packing can be prevented.

Moreover, since it is screwed on a sheet member, the chip clamp screw which fixes a chip on the other hand does not need to form a screw hole along the tangential direction of the body of a tool, and thereby, in forming, it does not have the thing of a chip pocket for which the configuration receives constraint by such screw hole, either. For this reason, it can stop that the width of face of the tool hoop direction of a chip pocket becomes large beyond the need, and while being able to aim at reduction of the cutting load which increases the number of chip pockets which can be formed in the body of a tool, i.e., the number of chips with which the body of a tool can be equipped, and acts on each chip, it becomes possible to raise a cutting efficiency.

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TECHNICAL FIELD

[Industrial Application]
This design is related with slow away type cutting tools (it abbreviates to a cutting tool hereafter.) with which the chip mounting eye of the body of a tool was equipped with the throwaway tip (it abbreviates to a chip hereafter.) through the sheet member, such as an end mill and a face cutter.
[0002]

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PRIOR ART

[Description of the Prior Art]
As a clamp device of the chip in such a cutting tool, the thing as shown, for example in drawing 9 and drawing 10 or drawing 11 , and drawing 12 is known.
They are the chip mounting eye which is the body of a tool with which a sign 1 consists of steel materials etc. in these drawings and by which the chip pocket by which a sign 2 is formed in this body 1 of a tool, and a sign 3 are formed in the tool hand-of-cut (it sets to each drawing and is left-hand side from right-hand side) back side of this chip pocket 2, and a sign.
4 is the plate-like chip of products made from hard material, such as cemented carbide with which this chip mounting eye 3 is equipped. In addition, drawing 9 and drawing 11 show the example equipped with the chip 4 with which top-face 4A used as a rake face is made into the flat side among these drawings, and drawing 10 and drawing 12 show the example equipped with the chip 4 with a breaker with which the way was dented among this top-face 4A.
[0003]
Here, in the example shown in drawing 9 and drawing 10 , the chip mounting eye 3 is equipped with the chip 4 through the plate-like sheet member 5. Moreover, ahead [of the chip mounting eye 3 / tool hand-of-cut], the crevice 6 is formed on the base of a chip pocket 2, and the wedge member 7 is inserted in this crevice 6.
And by pushing in this wedge member 7 in a crevice 6 with a clamp screw (illustration abbreviation) etc., a chip 4 is pressed at the base 3A side that top-face 4A turns [A] to the tool hand of cut of the chip mounting eye 3, and is fixed to the body 1 of a tool. in addition, this example -- setting -- the cutting edge of a chip 4 -- the location of 4B is positioned when side-face 4C of a chip 4 contacts wall surface 3B of the chip mounting eye 3.
[0004]
On the other hand, in the example shown in drawing 11 and drawing 12 , while through tube 4D is formed in the thickness direction at a chip 4, chip clamp screw hole 3C is formed in base 3A of the chip mounting eye 3, and the chip 4 has composition fixed to the body 1 of a tool by screwing on chip clamp screw hole 3C the chip clamp screw 8 inserted in the above-mentioned through tube 4D.
[0005]

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EFFECT OF THE INVENTION

[Effect of the Device]
As explained above, according to this design, for this reason, improvement in swarf eccritic can be aimed at so that clamp members, such as a wedge member, cannot cover the rake face of a chip, and generating of chip packing can be prevented.
Moreover, since it is screwed on a sheet member, the chip clamp screw which fixes a chip on the other hand does not need to form a screw hole along the tangential direction of the body of a tool, and thereby, in forming, it does not have the thing of a chip pocket for which the configuration receives constraint by such screw hole, either. For this reason, it can stop that the width of face of the tool hoop direction of a chip pocket becomes large beyond the need, and while being able to aim at reduction of the cutting load which increases the number of chip pockets which can be formed in the body of a tool, i.e., the number of chips with which the body of a tool can be equipped, and acts on each chip, it becomes possible to raise a cutting efficiency.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]
however, in the example first shown in drawing 9 and drawing 10 , that are the structure which presses a chip 4 from the top-face 4A side which becomes the rake face by the wedge member 7, and is fixed, and a part of top-face 4A is covered with the wedge member 7 avoids -- not having -- this -- a failure -- becoming -- a cutting edge -- there was a possibility that eccritic [of the swarf generated by 4B] might be checked. Moreover, since the volume of a chip pocket 2 was made to decrease by the wedge member 7, there was also a possibility that chip packing might arise.
[0006]
A wedge member etc. seems not to become a failure on the other hand, in the example shown in drawing 11 and drawing 12 , since a chip 4 is directly attached in the chip mounting eye 3 with the chip clamp screw 8, without using a wedge member etc.
However, in order to arrange so that top-face 4A used as the rake face of a chip 4 may become perpendicular to a tool hand of cut, chip clamp screw hole 3C screwed in the chip clamp screw 8 must be formed along the tangential direction of the body 1 of a tool. And in order to form such a screw hole in base 3A which turns to the tool hand of cut of the chip mounting eye 3, as shown in drawing 11 and drawing 12 , a chip pocket 2 must also be formed along the tangential direction of the body 1 of a tool, and, for this reason, the width of face W of body of tool 1 hoop direction of each chip pocket 2 cannot but become larger than the example shown in drawing 9 and drawing 10 .
Consequently, in the cutting tool shown in drawing 11 and drawing 12 , the number of the chip pockets 2 which can be formed in the body 1 of a tool of fixed magnitude, i.e., the number of the chips 4 with which the body 1 of a tool can be equipped, will be restricted naturally, and it had the problem that will cause increase of the cutting load which acts on each chip 4, and a chip life will be shortened.
[0007]

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MEANS

[Means for Solving the Problem]
In the cutting tool which it was made in order that this design might solve such a technical problem, and the chip mounting eye formed in the body of a tool is equipped with a chip free [attachment and detachment], and changes Between this chip and a chip mounting eye, the sheet member which has a chip clamp screw hole is infixed. While this sheet member is pressed to the base side of a chip mounting eye by the clamp member and fixing It is characterized by having screwed on the above-mentioned chip clamp screw hole the chip clamp screw which the side face of at least 1 was made to contact the wall surface of a chip mounting eye, and inserted the above-mentioned chip in the chip concerned, and fixing to the above-mentioned sheet member.
[0008]

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OPERATION

[Function]
In the cutting tool of such a configuration, a chip is attached in a sheet member with a chip clamp screw, and this sheet member is attached in the body of a tool by clamp members, such as a wedge member. Therefore, while being able to fix a chip to the body of a tool, preventing covering a chip top face with a wedge member and attaining smooth swarf discharge, without pressing a chip top face directly by the wedge member like the conventional cutting tool, the volume of a chip pocket is securable.
Moreover, since the chip clamp screw hole which a chip clamp screw screws on will be formed in a sheet member, in order to form such a screw hole, it becomes possible [stopping that it becomes unnecessary to form a chip pocket along the tangential direction of the body of a tool, and the width of face of the hoop direction of a chip pocket becomes long unnecessarily].
[0009]

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EXAMPLE

[Example]
Drawing 1 thru/or drawing 5 show one example at the time of using this design for a face cutter. It is referred to as attaching hole 11A at the time of nothing, among those a periphery equipping the spindle nose of a machine tool etc. with the shape of a multistage cylinder whose diameter is expanded as the body 11 of a tool is formed from steel materials etc. and it goes to the tip side in these drawings. And two or more chip-pocket 12 -- is formed in the point periphery of this body 11 of a tool along that hoop direction at regular intervals, and they are these chip pockets 12. -- Tool hand of cut (it sets to drawing 2 and is the direction of a counterclockwise rotation) Back, the chip mounting eye 13 is formed.
[0010]
Base 13A of the shape of an abbreviation rectangle which sees from a tool hand-of-cut front side, and is prolonged in the direction of tool axis O, and two wall surfaces 13B and 13C which rise high from this base 13A, and go to a tool hand-of-cut front side are formed in this chip mounting eye 13. Heights 13D which swells toward the direction outside of the diameter of a tool into the tool hand-of-cut front part is formed in wall surface 13B which crosses in the direction of the diameter of a tool among these wall surfaces 13B and 13C. Moreover, it escapes to a part for an intersection with base 13A, and 13E is formed in wall surface 13C which meets in the direction perpendicular to the direction of tool axis O among wall surfaces 13B and 13C. Furthermore, the crevice 14 dented inside [direction of path] the body 11 of a tool is formed in the tool hand-of-cut front side from the chip pocket 12 rather than this chip mounting eye 13 the direction end face side of tool axis O of this chip mounting eye 13, and the clamp screw hole which is not illustrated is formed in base 14A of this crevice 14.
[0011]
The chip 15 with which such a chip mounting eye 13 is equipped on the other hand is considered as the chip with a breaker with which top-face 15A which is the chip of the abbreviation square plate-like positive type formed from hard material, such as cemented carbide as shown in drawing 6 and drawing 7 , and becomes a rake face was dented in the chip thickness direction inside by this example. moreover -- the crossover ridgeline section of top-face 15A of this chip 15, and each side-face 15B -- a cutting edge -- 15C is formed.
Furthermore, insertion hole 15E which penetrates in that thickness direction and carries out opening of the chip 15 concerned to the center section of the above-mentioned top-face 15A and inferior-surface-of-tongue 15D is formed in this chip 15.
[0012]
In this example, the above-mentioned chip mounting eye 13 is equipped with the chip 15 of such a configuration through the sheet member 16.
It is the abbreviation Nogata form plate-like member in which this sheet member 16 was formed from hard material, such as cemented carbide, as well as [in this example] a chip 15, and the configuration and magnitude of those vertical sides 16A and 16B spread abbreviation etc. on base 13A of the chip mounting eye 13, and it is set up. Moreover, the thickness of this sheet member 16 is set up so that it may become smaller than the height of the wall surfaces 13B and 13C of the chip mounting eye 13, and as shown especially in drawing 5 , it is set up smaller than

the height to heights 13D of base 13A to wall surface 13B of the chip mounting eye 13. Furthermore, chip clamp screw hole 16C which penetrates the sheet member 16 concerned in that thickness direction is formed in this sheet member 16 so that opening may be carried out to one end-face 16D side of the sheet member 16 rather than the center of a longitudinal direction of top-face 16A.

[0013]

Such a sheet member 16 sticks inferior-surface-of-tongue 16B to base 13A of the chip mounting eye 13. While turning end-face 16D of the method of top Norikazu to the direction tip side of tool axis O, other-end side 16E is made to contact wall surface 13C of the chip mounting eye 13. Moreover, one side-face 16F are made to contact wall surface 13B, the chip mounting eye 13 is equipped, and in this condition, above-mentioned chip clamp screw hole 16C is arranged so that opening may be carried out to the direction tip side of tool axis O of the chip mounting eye 13 toward a tool hand of cut.

On the other hand, the wedge member 17 as a clamp member in this example is inserted in the above-mentioned crevice 14 formed ahead [of the chip mounting eye 13 / tool hand-of-cut]. And by screwing on the above-mentioned clamp screw hole the clamp screw 18 inserted in this wedge member 17, and bolting it, the above-mentioned sheet member 16 is pressed by press side 17A of the wedge member 17 towards the base 13A side of the chip mounting eye 13, and is fixed to the body 11 of a tool.

[0014]

In addition, in this example, the plate-like supporter 19 is infixed between press side 17A of this wedge member 17, and top-face 16A of the sheet member 16. This supporter 19 is the member plate-like [rectangular] formed from hard material, such as cemented carbide, as well as [in this example] the above-mentioned chip 15 and the sheet member 16. While sticking inferior surfaces of tongue 19A and 19B to above-mentioned press side 17A and top-face 16A of the sheet member 16 moreover, respectively and turning the side-face 19C of 1 to the direction tip side of tool axis O With this side-face 19C, other side-face 19D of 1 of the opposite side is made to contact wall surface 13C of the chip mounting eye 13, and it **** between the wedge member 17 and the sheet member 16.

Thus, by fixing the sheet member 16 to the chip mounting eye 13, it will be demarcated by top-face 16A of the sheet member 16, heights 13D of wall surface 13B of the chip mounting eye 13, and supporter 19 top Norikazu's side-face 19C, and the hollow which carries out opening to the apical surface and peripheral face of a chip pocket 12 and the body 11 of a tool will be formed in this chip mounting eye 13. In addition, above-mentioned chip clamp screw hole 16C is set up so that opening may be carried out in the center of abbreviation of top-face 16A of the sheet member 16 in this hollow.

[0015]

And the above-mentioned chip 15 makes another side contact supporter 19 top Norikazu's side-face 19C while making one side of the two side faces 15B and 15B which are made to stick inferior-surface-of-tongue 15D to top-face 16A of the sheet member 16 in this hollow, and cross mutually contact heights 13D, and the hollow formed in this chip mounting eye 13 is equipped with it.

Furthermore in this condition, the cutting edges 15C and 15C which stand in a row on two side faces 15B and 15B other than above-mentioned two side-faces of chip 15 15B, and 15B It is set up so that it may project slightly from the apical surface and peripheral face of the body 11 of a tool, respectively. And by being arranged so that insertion hole 15E of a chip 15 and chip clamp screw hole 16C may serve as the abbreviation same axle, inserting the chip clamp screw 20 in this insertion hole 15E, and screwing on and concluding to chip clamp screw hole 16C A chip 15 is fixed to the body 11 of a tool through the sheet member 16. In addition, in side-face 19C of 1 of a field and the above-mentioned supporter 19 which turns to the tool periphery side of the above-mentioned heights 13D, it is side-face 15B of a chip 15. -- The tilt angle is attached according to recess.

[0016]

It seems that will see from a tool periphery side as it is indicated in drawing 4 as a chip 15 and

the wedge member 17, it will be arranged so that it may stand in a line in the direction of tool axis O, and the wedge member 17 covers ahead [of top-face 15A / tool hand-of-cut] used as the rake face of a chip 15, and it does not hang over it in the cutting tool of such a configuration.

For this reason, smoothly, the swarf generated by the cutting edges 15C and 15C of a chip 15 will flow, will be discharged in a chip pocket 12, can aim at improvement in swarf eccritic compared with the conventional cutting tool as shown in drawing 9 and drawing 10 , and can prevent generating of chip packing.

[0017]

Moreover, in the cutting tool of the above-mentioned configuration, the chip clamp screw 20 for fixing a chip 15 is screwed on chip clamp screw hole 16C formed in the sheet member 16. For this reason, it is not necessary to form a screw hole in the body 11 of a tool along that tangential direction, therefore to form a chip pocket along this tangential direction like the conventional cutting tool shown in drawing 11 and drawing 12 .

It can stop by this that the width of face W of body of tool 11 hoop direction of a chip pocket 12 becomes large beyond the need, therefore the number of the chip pockets 12 which can be formed in the body 11 of a tool, i.e., the number of the chips 15 with which the body 11 of a tool can be equipped, can be increased, and while being able to aim at reduction of the cutting load which acts on each chip 15, it becomes possible to raise a cutting efficiency.

[0018]

Furthermore, by this example, a chip 15 makes other side-face 15B of 1 which that side-face 15B of 1 is made to contact heights 13D of wall surface 13B of the chip mounting eye 13 formed in the body 11 of a tool, and intersects this side-face 15B of 1 contact side-face 19C of 1 of the supporter 19 ****(ed) between the sheet member 16 and the wedge member 17, and is positioned. With side-face 19C of 1 of this supporter 19 here other side-face 19D of 1 of the opposite side Since it is made to contact wall surface 13C of the chip mounting eye 13 formed in the body 11 of a tool, as a result a chip 15 While side-face 15B of 1 contacts the body 11 of a tool directly, other side-face 15B of 1 will be too positioned in contact with the body 11 of a tool through a supporter 19.

For this reason, according to this example, in spite of fixing the chip 15 to the body 11 of a tool through the sheet member 16, it becomes it is possible to secure that location precision with the high level, and possible to aim at improvement in the location precision of the cutting edges 15C and 15C formed in this chip 15, and the deflection precision of the so-called edge of a blade.

[0019]

By this example, the sheet member 16 and the supporter 19 are formed from hard material, such as cemented carbide, as well as a chip 15 further again. For this reason, although the number of components increases compared with the former while extension of the life of these members is achieved, it becomes possible to secure the rigidity of the chip mounting-eye 13 circumference.

[0020]

In addition, in this example, although the supporter 19 was infixed between the sheet member 16 and the wedge member 17, it is good also as a configuration which does not prepare such a supporter. In this case, it is possible to secure the location precision of a chip 15 by preparing a step which applies, for example to top-face 16A of the sheet member 16 at a supporter 19, and making side-face 15B of 1 besides the above of a chip 15 contact the level difference side of this step and top-face 16A.

moreover, the chip 15 without a breaker although the positive type chip with a breaker as shown in drawing 6 and drawing 7 as a chip 15 was used in this example, as the cross section shown, for example in drawing 8 -- or the chip of a negative mold may be used.

furthermore -- although this example explained the case where this design was used for a face cutter -- the shaving-by-rolling tool of others for example, such as an end mill of a slow away type, -- or it can also use for the boring bar of a slow away type, a cutting tool, etc.

[0021]

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the sectional side elevation of the face cutter in which one example of this design is shown.
[Drawing 2] It is the sectional view which looked at the example shown in drawing 1 from the apical surface side.
[Drawing 3] It is the side elevation of the chip mounting-eye 13 circumference of the example shown in drawing 1 .
[Drawing 4] It is the expansion side elevation of the chip mounting-eye 13 circumference of the example shown in drawing 1 .
[Drawing 5] It is the expansion front view fractured the part from the apical surface side of the chip mounting-eye 13 circumference of the example shown in drawing 1 .
[Drawing 6] It is the top view of the chip 15 used for the example shown in drawing 1 .
[Drawing 7] It is AA sectional view of the chip 15 shown in drawing 6 .
[Drawing 8] It is the sectional view showing other examples of the chip 15 shown in drawing 6 .
[Drawing 9] a part of chip mounting-eye 3 circumference which shows the conventional cutting tool -- it is a fracture expansion front view.
[Drawing 10] a part of chip mounting-eye 3 circumference which shows the conventional cutting tool -- it is a fracture expansion front view.
[Drawing 11] a part of chip mounting-eye 3 circumference which shows the conventional cutting tool -- it is a fracture expansion front view.
[Drawing 12] a part of chip mounting-eye 3 circumference which shows the conventional cutting tool -- it is a fracture expansion front view.
[Description of Notations]
1 11 Body of a tool
2 12 Chip pocket
3 13 Chip mounting eye
3A, 13A Base of a chip mounting eye
3B, 13B, 13C Wall surface of a chip mounting eye
3C, 16C Chip clamp screw hole
4 15 Chip
5 16 Sheet member
6 14 Crevice
7 17 Wedge member (clamp member)
8 20 Chip clamp screw
13D Heights
19 Supporter

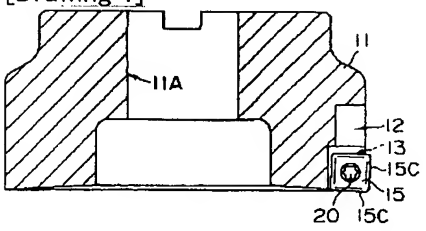
[Translation done.]

* NOTICES *

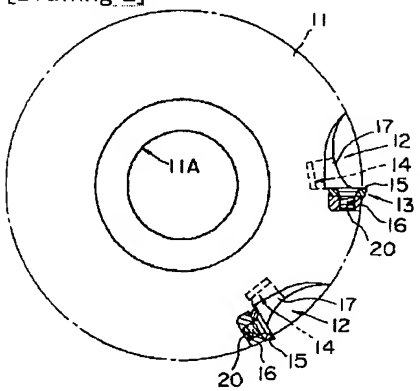
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

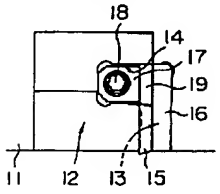
[Drawing 1]



[Drawing 2]



[Drawing 3]



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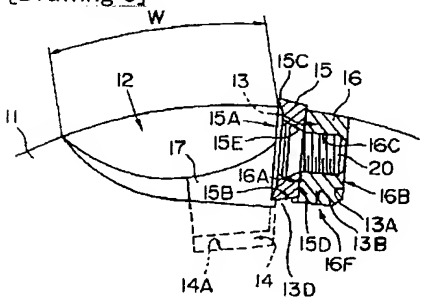
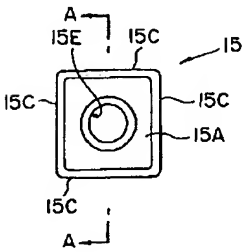


[Drawing 6]



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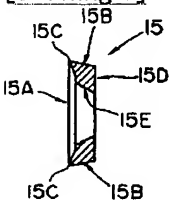
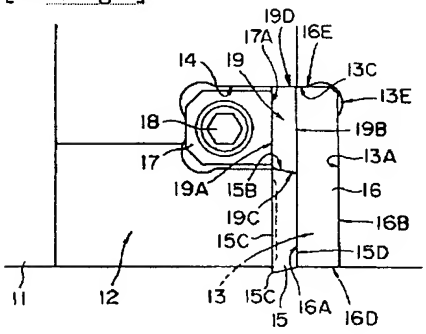
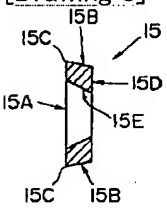


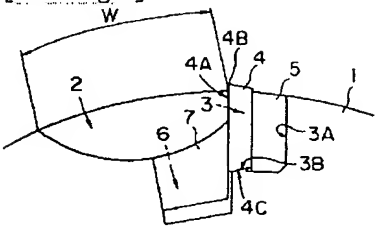
[Drawing 4]



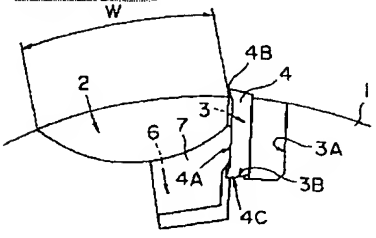
[Drawing 8]



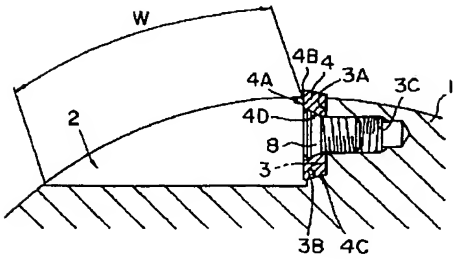
[Drawing 9]



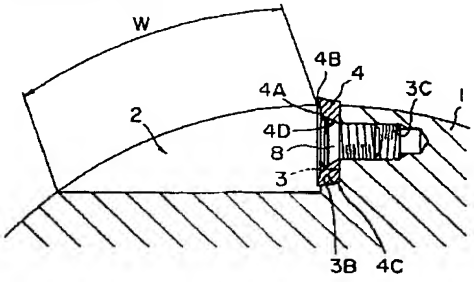
[Drawing 10]



[Drawing 11]



[Drawing 12]



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JP5070823

Title:
ROLLER FOR ROLLER HEARTH KILN

Abstract:

PURPOSE:To restrain the oxidative deterioration at a part of a roller in a furnace under using at high temp. and also at both end parts of the roller penetrating the furnace walls in the roller used to a roller hearth kiln. CONSTITUTION:The roller base material 6 is constituted with recrystallized silicon carbide and in this roller base material 6, alumina and calcia are contained at the part 6a positioned in the furnace and metallic silicon is impregnated into both end parts 6b, 6b of the material in the outsides from the furnace walls 1.

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(71)出願人　000004064
日本碍子株式会社
愛知県名古屋市瑞穂区須田町２番56号

(71)出願人　000237868
エヌジーケイ・アドレツク株式会社
愛知県名古屋市瑞穂区須田町２番56号

(72)発明者　小宮山　常夫
岐阜県可児郡御嵩町美佐野3040番地

(72)発明者　鈴木　巌
岐阜県可児郡御嵩町井尻65番地の２

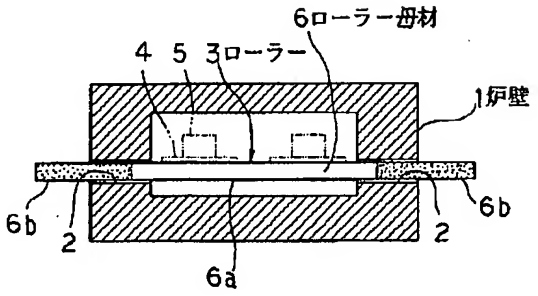
(74)代理人　弁理士　佐藤　強　(外１名)

(54)【発明の名称】　ローラーハースキルン用のローラー

(57)【要約】

【目的】　本発明は、ローラーハースキルンに用いられるローラーにおいて、高温使用下での炉内部分の酸化劣化を抑制すると共に、炉壁を貫通する両端部分での酸化劣化も抑制するようにしている。

【構成】　ローラー母材６を再結晶炭化珪素から構成し、このローラー母材６のうち、炉内に位置する部分６ａにアルミナとカルシアとを含有させ、炉壁１から外側の両端部分６ｂ，６ｂに金属シリコンを含浸処理している。



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【特許請求の範囲】

【請求項1】　ローラーハースキルンにその炉壁を貫通する形態で設けられるローラーにおいて、ローラー母材を再結晶炭化珪素から構成し、このローラー母材のうち、炉内に位置する部分にアルミナとカルシアとを含有すると共に、炉壁から外側の両端部に金属シリコンを含浸させたことを特徴とするローラーハースキルン用のローラー。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、ローラーハースキルン用のローラーの改良に関する。

【0002】

【従来の技術】ローラーハースキルンでは、周知のように炉壁を貫通する形態でローラーを備えており、そのローラーとしては、耐熱性に優れた再結晶炭化珪素からなるローラーが用いられている。しかし、耐熱性に優れているとはいうものの約1000℃以上の高温で使用されると、炭化珪素と酸素が反応して二酸化珪素が生成され、この酸化によって体積膨脹が生じてローラーに曲りが発生したり折損が発生したりすることがある。

【0003】

【発明が解決しようとする課題】この対策として、上記ローラーの全体に、アルミナとカルシアとを形成する酸化防止剤を含浸処理するようにしたものがある。このものでは、炉内の高温下では表面がガラス化して酸化抑制被膜が形成され、この結果酸化が抑制される。ところがこの場合、さほど温度が高くないローラーの両端部（炉壁から外側の端部）では、上記ガラス化しないために酸化抑制被膜が形成されず酸化抑制効果が不十分となる。このために、これらの部分で酸化による曲りや折損等が発生するおそれがみられる。

【0004】一方、ローラー端部の酸化抑制を図るについては、次のようにすることも考えられる。すなわち、再結晶炭化珪素の全域の開気孔に金属シリコンを含浸させることにより、酸素との接触面積を極端に減少させ、酸化抑制効果を向上させる。ところがこの場合、ローラー全域の開気孔に金属シリコンを均一に含浸させることは、生産技術上かなり難しく、開気孔がそのまま残ってしまうことがあり、その部分での酸化が著しく、曲り、折損等のトラブルが発生することが懸念される。また、金属シリコンの融点が約1400℃であることから、炉内の温度がそれ以上となると、ローラーにおける炉内部分から金属シリコンが融出してセッターに付着したりあるいはローラーに開気孔ができ、その部分の酸化により実際に使用できない不具合がある。

【0005】本発明は上記事情に鑑みてなされたものであり、その目的は、高温使用下での炉内部分の酸化劣化を抑制できると共に、炉壁を貫通する両端部での酸化劣化も抑制でき、しかも生産技術にも困難さがなくて生産性の良いローラーハースキルン用のローラーを提供するにある。

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【0006】

【課題を解決するための手段】本発明のローラーハースキルン用のローラーは、ローラーハースキルンにその炉壁を貫通する形態で設けられるものにおいて、ローラー母材を再結晶炭化珪素から構成し、このローラー母材のうち、炉内に位置する部分にアルミナとカルシアとを含有すると共に、炉壁から外側の両端部分に金属シリコンを含浸させたところに特徴を有する。

【0007】

【作用】本発明のローラーは、炉内に位置する部分が再結晶炭化珪素にアルミナとカルシアとを含有しているから、高温下でローラー表面がガラス化することにより酸化抑制被膜が形成されて酸化が有効に防止される。また、ローラーにおける両端部分は再結晶炭化珪素に金属シリコンが含浸されているから、再結晶炭化珪素からなる母材の気孔に金属シリコンが充填されることとなって酸素との接触面積が減少し、これによって低温下での酸化が有効に防止される。この結果、ローラー全体における酸化劣化の発生を抑制できる。しかも金属シリコンの含浸処理はローラー母材の両端部といった一部分ですむので、ローラー全域に金属シリコンを含浸処理する場合と違って生産技術的にもさほど困難さはない。

【0008】

【実施例】以下、本発明の第1の実施例について、図1ないし図4を参照しながら説明する。図1において、ローラーハースキルンの炉壁1の対向側壁には貫通口2，2が形成され、そして炉壁1には貫通口2，2を通してローラー3が貫通されており、このローラー3は周知のように図示しない支持ローラーによって支持され、そして図示しない駆動機構によって回転駆動されるようになっている。また、このローラー3の回転によって、セッタ4上にのせされた被焼成物5がセッタ4ごと搬送されるものである。

【0009】上記ローラー3は、ローラー母材6が再結晶炭化珪素の焼結部材から円筒状に構成されている。そして、このローラー母材6の炉内に位置する部分6aにはアルミナとカルシアとを形成する酸化抑制剤が含浸されている。また、このローラー母材6の両端部6b，6bには金属シリコンを含浸させており、もってその気孔にはこの金属シリコンが充填されている。

【0010】このようなローラー3の製造に関して説明する。すなわち、図2に示すように、再結晶炭化珪素のローラー母材6の両端部6b，6bの内部に金属シリコンのインゴットを置き、アルゴンガス雰囲気中で、1450℃に加熱して金属シリコンを溶融しつつ気孔に含浸させる。この含浸処理の後、アルミナとカルシアとを形成する酸化防止剤をローラー母材6全体に含浸させ、そして酸化雰囲気中で焼成することで気孔内表面部に酸化

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抑制被膜を形成する。この場合ローラー母材6の両端部には既に金属シリコン含浸処理が施されているから、この酸化防止剤はさほど含浸せず、専ら炉内に位置される部分6aに含浸される。

【0011】上記両端部6b，6bにおける金属シリコン含浸処理の領域は、ローラー3の実際の使用条件を考慮して定めることが好ましい。すなわち、図3に示すように、炉壁1の温度は内表面から外表面にかけて下降勾配を示すが、シリコン含浸処理の領域の炉内側限界位置は1000℃～1300℃の範囲内であることが最適である。その理由は、この温度範囲を外れると含浸処理したシリコンの融出や酸化が発生するおそれがあるからである。

【0012】また、上記金属シリコン含浸処理は、本実施例においては見掛気孔率が5％を超えないようにしている。本発明者の実験によると、次の結果が判明した。金属シリコンの含浸処理を行なったテストピースを複数個用意した。各テストピースは、金属シリコンの量をそれぞれ違えて含浸処理を行なうことで見掛気孔率が個々に異なるようにしている。

【0013】このテストピースの製造例について述べると、外径（直径）40㎜、内径（直径）28㎜、長さ100㎜の再結晶炭化珪素パイプの中に金属シリコンのインゴットを入れ、これをアルゴンガスおよび温度1500℃の雰囲気中で3時間保持することで、金属シリコンを含浸させている。この場合、金属シリコンの量Wは、次の式にて決定する。

【0014】W＝（A－B）×d／C

Aは含浸前テストピースの見掛気孔率、Bは含浸後の見掛気孔率（目標とする見掛気孔率）、Cは含浸前テストピースの嵩比重、dは金属シリコンの真比重を示す。見掛気孔率の測定は、ＪＩＳに従い水置換法にてテストピースの中央部（50㎜部分）で行なった。

【0015】各テストピースについての酸化速度の測定は、酸化重量増加率でもって求めた。その測定の設備は図4に示し、測定結果は表1に示している。

【0016】

【表1】

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見掛気孔率%	酸化速度 ppm/Hr	備考
0	0.01	Si含浸
1	0.01	Si含浸
4	0.02	Si含浸
5	0.21	Si含浸
6	5.1	Si含浸
8	10.1	Si含浸
20	230	Si未含浸

図4に示すように、密閉ケース11の内部に収容された95℃状態の湯の中に、酸素を、毎分100ccの量で送り込み、その酸素を、テストピース12が収容された炉13内に供給する。そして炉13内は常に1000℃状態に保っている。この結果、テストピース12は、1000℃の温度雰囲気で、95℃で飽和水蒸気の酸素が毎分100ccの量で与えられる。この状態を350時間保持し、そして、250時間目から350時間目まで酸化重量増加を測定して、単位時間当りの酸化重量増加率を求めた。

【0017】炭化珪素の酸化反応は、下記の反応式で示される。

【0018】$SiC+2O_2 \rightarrow SiO_2+CO_2 \uparrow$

ここで、SiCは分子量＝40、比重＝3．22で、そしてSiO_2は分子量＝60、比重＝2．32である。この結果、酸化によって重量増加と体積膨脹とがみられる。

【0019】表1から判るように、見掛気孔率が5％を境に酸化速度が大きく変化する。すなわち、6％以上の場合では、酸化速度が5．1［ppm/Hr］以上となるのに対し、5％以下の場合では0．21［ppm/Hr］以下となる。なお、この表1には金属シリコン含浸処理をしない場合を最下欄に示している。これから判るように、この未処理の場合には見掛気孔率は20％で、そのときの酸化速度は230［ppm/Hr］であった。

【0020】

【表2】

ローラー	使用温度			備考	総合評価
	1300℃	1400℃	1500℃		
炉内 アルミナ＋カルシア 端部シリコン	2年以上	2年以上	2年以上		良好
未処理	350Hr	300Hr	260Hr	炉内中央部 曲がり、折れ	不良
全域アルミナ＋カルシア	1000Hr	1000Hr	1000Hr	炉壁部(1000℃近辺) 曲がり、折れ	不良
再結晶炭化珪素に シリコン含浸	2年以上	使用不可	使用不可	シリコン融出発生	高温不可

また、表2には、本実施例ローラーの場合と、これ以外のローラーとについて、社内の小形ローラハースキルンにより耐久試験を行なった結果の耐用時間を示すと共に、耐用時間の限度要因および総合評価を示した。なお、耐用時間の好ましい目標値は「2年以上」とされている。まず、本実施例ローラーの場合、つまり炭化珪素の母材の炉内部分にアルミナとカルシアとを含有させ、両端部には金属シリコン含浸処理を施したローラーの場合、使用温度が１３００℃、１４００℃および１５００℃のいずれでも耐用時間が2年以上となり、総合評価は「良好」である。

【００２１】ローラーが再結晶炭化珪素のみから構成されている場合（未処理の場合）には、使用温度が１３００℃、１４００℃および１５００℃のいずれでも耐用時間が３５０時間を超えることはない。このときの耐用時間の限度要因は、炉内中央部の曲りもしくは折れ発生であった。総合評価は「不良」であった。

【００２２】ローラー全域にアルミナとカルシアとを含有させる処理のみが施されている場合、使用温度が１３００℃、１４００℃および１５００℃のいずれでも耐用時間が１０００時間程度で、このときの耐用時間の限度要因は、ローラー端部（約１０００℃部分）での曲りもしくは折れ発生であった。この場合も総合評価は「不良」である。

【００２３】ローラーが、再結晶炭化珪素の開気孔に金属シリコンを充填処理した構成である場合には、使用温度が１３００℃では耐用時間は2年以上となるが、１４００℃を超えると、使用不可（耐用時間はほとんど零）となる。このときの耐用時間限度要因は、炉内を１４００℃以上に立ち上げたときに金属シリコンの融出が発生し、実使用が不可能となった。総合評価は「高温不可」である。

【００２４】このように本実施例のローラー３は、ローラー母材６を再結晶炭化珪素から構成し、このローラー母材６の炉内に位置する部分６ａにはアルミナとカルシアとを含有させているから、高温下でローラー３表面がガラス化して酸化抑制被膜が形成され、よって酸化が有効に防止される。また、ローラー母材６における両端部６ｂ，６ｂには金属シリコンが含浸処理されたているから、ローラー母材６の気孔に金属シリコンが充填されることで酸素との接触面積が減少し、これによって低温下での酸化が有効に防止される。この結果、ローラー３全体における酸化劣化の発生を抑制できる。しかも金属シリコンの含浸処理はローラー母材６の両端部といった一部分ですむので、ローラー全域に金属シリコンを含浸処理する場合と違って生産技術的にもさほど困難さはない。

【００２５】なお、ローラー母材６の両端部６ｂ，６ｂに対する金属シリコンの含浸処理は、上記方法に限られず、例えば本発明の第２の実施例として示す図５のように、溶融金属シリコンの中へローラー母材６の端部６ｂを漬けることで含浸させるようにしても良い。

【００２６】

【発明の効果】本発明は以上の説明から明らかなように、ローラー母材を再結晶炭化珪素から構成し、このローラー母材のうち、炉内に位置する部分にアルミナとカルシアとを含有させると共に、炉壁から外側の両端部に金属シリコンを含浸させることにより、高温使用下での炉内部分の酸化劣化を抑制できると共に、炉壁を貫通する両端部分での酸化劣化も抑制でき、総じて、高温使用下での耐用時間を長期化できて使用寿命を飛躍的に延ばすことが可能で、しかも生産技術的にも困難さがなくて生産性が良く、コストの低廉化にも寄与できるという優れた効果を奏するものである。

【図面の簡単な説明】

【図１】本発明の第１の実施例を示すローラーハースキルンの縦断正面図

【図２】金属シリコン含浸処理方法を説明するための縦断面図

【図３】炉壁部分の温度勾配を示す図

【図４】実験設備の縦断面図

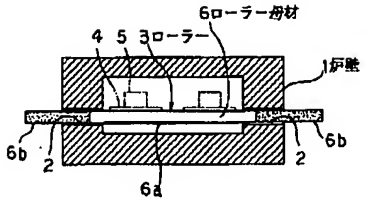
【図５】本発明の第２の実施例を示す図２相当図

【符号の説明】

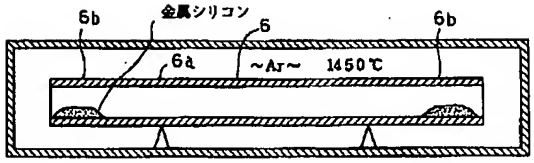
１は炉壁、２は貫通口、３はローラー、６はローラー母

材を示す。

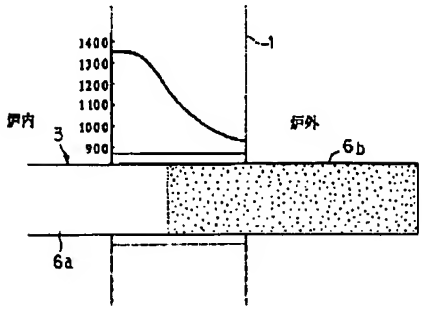
【図1】



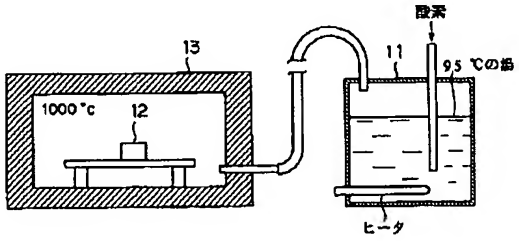
【図2】



【図3】



【図4】



【図5】